

the New England and middle Atlantic coasts generally attended the approach or passage of general storms.

A notable feature of the month was the exceptionally dense fog which enveloped London, England, from the 22d to 26th.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

Many of the voluntary stations do not have standard thermometers or shelters.

The distribution of mean temperature over the United States and Canada for December, 1891, is exhibited on Chart II by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperature and the departure from the normal are given for regular stations of the Weather Bureau. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the average for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Weather Bureau represents the mean of the maximum and minimum temperatures.

The mean temperature was highest over extreme southern Florida, where it was above 70; it was above 60 over the Florida Peninsula, in extreme southern Louisiana, and in the lower Rio Grande valley; and was above 50 over the southern half of the Gulf States, along the Mississippi River to Memphis, Tenn., over extreme southern California and southwestern Arizona, and along the immediate Pacific coast south of San Francisco, Cal. The mean temperature was lowest in Manitoba and thence over the Saskatchewan Valley east of the 110th meridian, where it was below 10; it was below 15 over northern North Dakota and northwestern Minnesota, and in the mountains of central Colorado; and was below 30 north of a line traced from the south part of the Gulf of Saint Lawrence westward over the Lake region and the upper Mississippi valley to north-central Nebraska, thence southward to central New Mexico, thence west-northwest to the Sierra Nevada range of mountains, which it followed to central Oregon, thence eastward over the valley of the Columbia River to northern Idaho, and thence northward over British Columbia.

DEPARTURES FROM NORMAL TEMPERATURE.

The mean temperature was generally above the normal east of the Rocky Mountains and in northeastern Oregon and eastern and northern Washington; elsewhere it was below the normal. The most marked excess in temperature was noted in northern Ontario, where it was more than 10, and the excess was more than 5 in the Atlantic coast states north of Virginia, and in districts north of the Ohio and Missouri Rivers. The most marked deficiency was reported over the middle and southern plateau regions, where it was more than 5, and a slight deficiency was noted along the immediate middle Gulf coast from western Florida to eastern Texas.

DEVIATIONS FROM NORMAL TEMPERATURE.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for December for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for December, 1891; (4) the departure of the current month from the normal; (5) and the extreme monthly mean for December during the period of observation and the years of occurrence:

State and station.	County.	(1) Normal for the month of Dec.	(2) Length of record.	(3) Mean for Dec., 1891.	(4) Departure from normal.	(5) Extreme monthly mean for December.			
						Highest.	Year.	Lowest.	Year.
Arkansas.		°	Years	°	°	°		°	
Lead Hill	Boone	39.4	10	44.4	+ 5.0	55.3	1889	29.1	1884
California.									
Sacramento	Sacramento	46.7	37	38.7	- 8.0	50.9	1861	39.4	1891

Deviations from normal temperature—Continued.

State and station.	County.	(1) Normal for the month of Dec.	(2) Length of record.	(3) Mean for Dec., 1891.	(4) Departure from normal.	(5) Extreme monthly mean for December.			
						Highest.	Year.	Lowest.	Year.
Connecticut.		°	Years	°	°	°		°	
Middletown	Middlesex	28.6	23	37.9	+ 9.3	37.9	1891	21.8	1872
Florida.									
Merritts Island	Brevard	62.6	9	68.0	+ 5.4	68.0	1891	58.0	1885
Georgia.									
Forsyth	Monroe	49.8	17	52.0	+ 2.2	61.3	1889	39.8	1876
Illinois.									
Peoria	Peoria	29.3	36	38.5	+ 9.2	44.3	1877	18.5	1876
Riley	McHenry	22.9	35	31.4	+ 8.5	37.7	1877	11.1	1876
Indiana.									
Vevay	Switzerland	34.9	26	41.7	+ 6.8	49.0	1889	24.6	1876
Iowa.									
Cresco	Howard	17.4	20	28.3	+ 10.9	34.0	1877	4.5	1876
Monticello	Jones	21.8	37	31.3	+ 9.5	39.5	1877	8.1	1859
Logan	Harrison	26.3	17	34.6	+ 8.6	39.6	1889	15.4	1879
Kansas.									
Lawrence	Douglas	30.7	24	38.3	+ 7.6	44.8	1889	19.8	1872
Wellington	Sumner	33.3	12	46.2	1889	23.1	1884
Louisiana.									
Grand Coteau	Saint Landry	56.3	9	54.7	- 1.6	65.0	1889	51.8	1887
Maine.									
Orono	Penobscot	20.8	21	31.6	+ 10.8	31.6	1891	11.4	1890
Maryland.									
Cumberland	Allegany	31.9	32	39.6	+ 7.7	43.2	1889	24.8	1866
Massachusetts.									
Amherst	Hampshire	33.6	45	37.2	+ 3.6	37.2	1891	19.5	1872
Newburyport	Essex	30.2	13	37.9	+ 7.7	37.9	1891	23.4	1860
Somerset	Bristol	30.6	19	40.7	+ 10.1	40.7	1891	21.8	1876
Michigan.									
Kalamazoo	Kalamazoo	29.4	15	36.0	+ 6.6	40.2	1889	16.7	1876
Thornville	Lapeer	27.7	14	35.4	+ 7.7	38.0	1889	19.6	1886
Minnesota.									
Minneapolis	Hennepin	15.5	27	27.2	+ 11.7	31.6	1877	1.9	1872
Montana.									
Fort Custer	Custer	22.8	12	29.4	+ 6.6	33.1	1885	5.6	1884
New Hampshire.									
Hanover	Grafton	20.6	53	29.5	+ 8.9	31.2	1847	10.2	1872
New Jersey.									
Moorestown	Burlington	32.4	28	40.7	+ 8.3	41.0	1889	23.9	1876
South Orange	Essex	31.8	21	39.6	+ 7.8	39.6	1891	24.3	1872
New York.									
Cooperstown	Otsego	27.1	37	33.9	+ 6.8	33.9	1891	14.7	1876
Palermo	Oswego	24.8	37	33.8	+ 9.0	33.8	1891	16.8	1880
North Carolina.									
Lenoir	Caldwell	38.2	19	41.7	+ 3.5	48.9	1889	29.1	1876
Ohio.									
N'th Lewisburgh	Champaign	30.1	59	39.0	+ 8.9	44.3	1889	19.0	1876
Wauseon	Fulton	27.2	21	35.5	+ 8.3	38.8	1877-'89	17.1	1872
Oregon.									
Albany	Linn	41.6	12	41.0	- 0.6	49.5	1886	32.1	1884
Eola	Polk	40.0	20	40.2	- 0.2	47.0	1886-'87	30.7	1884
Pennsylvania.									
Dyberry	Wayne	25.3	24	34.6	+ 9.3	34.6	1891	17.3	1876
Grampian Hills	Clearfield	25.6	27	34.8	+ 9.2	37.0	1877	16.0	1876
Wellaborough	Tioga	29.5	12	34.6	+ 5.1	39.5	1881	22.2	1890
South Carolina.									
Statesburgh	Sumter	47.6	10	50.6	+ 3.0	56.6	1889	43.6	1882
Tennessee.									
Austin	Wilson	40.8	21	46.9	+ 6.1	56.5	1889	25.0	1876
Texas.									
New Ulm	Austin	54.4	18	55.4	+ 1.0	65.8	1889	46.1	1876
Vermont.									
Stratford	Orange	21.6	18	31.2	+ 9.6	31.2	1891	13.4	1890
Virginia.									
Birdsnest	Northampton	41.5	23	46.8	+ 5.3	51.1	1879	32.7	1876
Washington.									
Fort Townsend	Jefferson	41.2	16	38.4	- 2.8	45.3	1885	33.0	1884
Wisconsin.									
Madison	Dane	22.9	22	31.1	+ 8.2	38.7	1877	11.7	1876

YEARS OF HIGHEST MEAN TEMPERATURE FOR DECEMBER.

Over the greater part of New England and in parts of eastern New York, eastern Pennsylvania, and New Jersey the current month was the warmest December on record. In New England the mean temperature was 6 to 10 above the normal, and 1 to 2 above the highest mean previously reported for December, noted in 1881 and 1889; in eastern New York, eastern Pennsylvania, and New Jersey the mean was 6 to 9 above the normal, and about 1 above that of 1889; and at Merritts Island, Fla., the mean for the current month was 5.4 above the normal, and 1 above the mean of 1883. The highest mean

temperature for December occurred on the south Pacific coast, in the upper valley of the Columbia River, over northern North Dakota, and in the lower valley of the Red River of the North in 1890; from the middle and southern plateau regions to the Atlantic coast south of the 40th parallel in 1889; along the Pacific coast north of San Francisco, Cal., in 1886; on the northeastern slope of the Rocky Mountains in 1885; and over the upper lake region and upper Mississippi valley in 1877.

YEARS OF LOWEST MEAN TEMPERATURE FOR DECEMBER.

At stations in the middle and southern plateau regions and on the middle and south Pacific coasts the mean temperature for the current month was the lowest ever reported for December. In the middle and southern plateau regions the mean temperature was 5 to 7 above the normal, and 1 to 3 above the highest mean previously noted for December, and on the middle and south Pacific coasts it was 4 to 5 above the normal, and 1 to 2 above the highest mean temperature on record for the month. The lowest mean temperature for December occurred generally east of the Mississippi River and south of the Lake region in 1876, and from the northeastern slope of the Rocky Mountains to the north Pacific coast in 1884.

MAXIMUM TEMPERATURE.

At New York and Buffalo, N. Y., Norfolk, Va., La Crosse, Wis., and Duluth, Minn., the maximum temperature for the current month was the highest ever reported for December by amounts varying from 1 at Norfolk, Va., and Buffalo, N. Y., to 9 at La Crosse, Wis.; at Rio Grande City, Tex., and Roseburgh, Oregon, the maximum temperature was as high as previously reported for the month.

The maximum temperature was above 80 over the Florida Peninsula, at stations along the immediate middle Gulf coast, and in the lower Rio Grande valley, and it was above 70 on the Atlantic coast south of Delaware, and generally south of the 35th parallel, except in northern Georgia, and over the greater part of New Mexico. The maximum temperature was lowest in eastern Upper Michigan, from the Red River of the North over North Dakota, and on the northeastern slope of the Rocky Mountains; where it was below 50.

MINIMUM TEMPERATURE.

At Montrose, Colo., Yuma, Ariz., and Keeler, Cal., the minimum temperature for the current month was the lowest ever reported for December by amounts varying from 1 at Montrose, Colo., to 6 at Keeler, Cal. (7 years' record), and at San Diego, Cal., the minimum temperature was as low as previously reported for the month.

The minimum temperature fell below -20 in the Red River of the North Valley, over the eastern part of the Dakotas, and in the Rocky Mountain range from central Colorado northward. The minimum readings were below zero in northern New England and northeastern New York, and north of a line traced from Upper Michigan southwestward to central New Mexico, thence to western Nevada, and thence to northern Idaho.

LIMITS OF FREEZING WEATHER.

The southern limit of freezing weather is shown on Chart V by a line traced from the Atlantic coast at Jacksonville, Fla., westward along or near the immediate Gulf coast line to the lower Rio Grande valley. The western limit of freezing weather is shown by a line traced along the immediate south and middle California and Oregon coasts.

RANGES OF TEMPERATURE.

The greatest daily ranges of temperature are shown in the table of miscellaneous meteorological data. The greatest monthly range of temperature, 81, was noted at Fort Assinaboine, Mont.; the monthly ranges exceeded 70 in areas in the central and north-central districts. From the interior of the country the monthly ranges decreased eastward to less than 50 along the immediate Atlantic coast; southward to less than 40 on the middle Gulf coast; and westward to less than 30 on the middle and north Pacific coasts.

PERIODS OF HIGH TEMPERATURE.

On the 1st the warmest weather of the month was noted in the central valleys of California and generally over the plateau region, where the temperature was 5 to 16 above the normal. By the 2d this warm wave had passed east of the Rocky Mountains; it extended over the east-central valleys and the Lake region during the 3d, and reached the Atlantic coast the morning of the 4th, with temperature more than 20 above the normal at points between the lower lake region and the Carolinas. A marked increase in temperature occurred over the southeast part of the plateau region on the 4th; this warmer condition extended eastward over the Gulf States and reached the Atlantic coast by the morning of the 7th, when the temperature was more than 20 above the normal at points between Nova Scotia and Florida.

During the 6th and 7th a marked increase in temperature was shown over the British Northwest Territory. During the 8th the warmer condition extended over the northern districts east of the Pacific coast, with the highest temperature of the month in the Red River of the North Valley and North Dakota, and by the 9th it extended southward over the eastern slope of the Rocky Mountains and the eastern part of the plateau region, with temperature more than 20 above the normal in the north-central districts, and the highest temperature of the month in Colorado and at stations in the Dakotas and Nebraska. By the 10th the warm wave had advanced to the Saint Lawrence Valley and northern New England, where the temperature was 10 to 20 above the normal. The evening of the 11th the temperature was more than 20 above the normal in the north-central districts. Unusually warm weather continued in those districts during the 12th, and the warm wave extended to the east Gulf coast, with the highest temperature of the month at points in eastern Washington, northern Wyoming, and South Dakota.

During the 13th and 14th warm weather prevailed east of the Rocky Mountains, and the highest temperature of the month was noted at points in the central valleys. During the 15th the warm wave reached the Atlantic coast, with temperature more than 20 above the normal from the lower lake region to Virginia, and the highest temperature of the month at points on Lake Erie. The warmest weather of the month occurred generally along the Pacific coast on the 15th and 16th. This warm wave extended to the middle and upper Missouri valleys by the 17th, and over the north part of the Lake region during the 18th, but failed to reach districts south of the Saint Lawrence Valley. During the 21st a warm wave, which had caused unusually high temperature in the north-central districts, advanced to the Ohio Valley, and extended thence to the Atlantic coast by the 22d. The temperature continued high in the Atlantic and east Gulf states during the 23d and 24th, with the highest temperature of the month at a number of stations in those districts.

A marked rise in temperature occurred in Manitoba on the 23d; this condition extended eastward; on the 24th the temperature was high east of the 95th meridian and in Texas, and by the evening of the 26th the warm wave had passed off the Atlantic coast. On the 27th a warm wave overspread the northeastern slope of the Rocky Mountains, with temperature 20 to 30 above the normal. During the 28th it extended over the central valleys, and passed off the Atlantic coast on the 29th. On this date a decided increase in temperature was noted over Montana, and this condition extended to the central valleys by the 30th. On the 31st the highest temperature of the month was reported at stations in the lower Missouri valley, and a warm wave occupied the region between the 95th meridian and the Alleghany Mountains.

PERIODS OF LOW TEMPERATURE.

The month opened with freezing weather almost to the immediate Gulf coast. This cold wave passed off the Atlantic coast during the 2d. On the 2d the temperature fell generally over the Rocky Mountain regions and on the Pacific coast, and by the 3d the cold wave had extended east of

the Rocky Mountains, with temperature 10 to 20 below the normal on the eastern slope of the Rocky Mountains, after which it lost intensity, and did not materially affect the temperature conditions of the central valleys. The temperature had continued generally below the normal over the western part of the country, and on the 5th a decided fall occurred west of the Rocky Mountains, and the temperature was 10 to 20 below the normal from the British Northwest Territory to western Texas. During the 6th the cold wave advanced to the Mississippi River, and during the 7th reached the Atlantic coast south of New England. On this date the temperature was below the normal, except in the north-central districts, and the lowest temperature of the month, 22, was noted at Abilene, Tex.

Low temperature continued over the southern part of the country during the 8th; over a great part of Texas it was more than 20 below the normal; the lowest temperature of the month was reported at El Paso and San Antonio, Tex., where the minimum fell to 8 and 26, respectively; and the minimum readings fell below 32 almost to the immediate Gulf and south Atlantic coasts. The weather continued cold in the Southern States until the 9th. The morning of the 16th the temperature was below zero in the Red River of the North Valley. During the 17th and 18th this cold wave extended over the Ohio Valley and the middle Atlantic and New England states, with temperature below freezing to the north part of the Gulf States and South Carolina, and the lowest temperature of the month occurred at points in the Lake region, the Ohio Valley, and the Atlantic coast states north of the Carolinas.

The morning of the 24th the temperature was below zero in the British Northwest Territory, and the coldest weather of the month was noted on the north Pacific coast, where the minimum temperature fell below freezing. On the 25th this cold wave extended over the entire Pacific coast and the plateau region and reached the eastern slope of the Rocky Mountains; the line of zero temperature extended from the middle plateau region to Minnesota; freezing weather occurred over the entire western half of the country, except along the immediate middle California coast; and the lowest temperature ever reported for December was reported at Yuma, Ariz., Keeler, Cal., and Montrose, Colo., where it was 25, 17, and -17, respectively. On the 26th the cold wave advanced to the Alleghany Mountains; the minimum temperature was below -20 in the Red River of the North Valley, and a reading of -27 was noted at Saint Vincent, Minn.; freezing weather oc-

curred north of a line traced from northern Louisiana to the lower lake region; the lowest temperature of the month was recorded at points in the western central valleys and the west part of the Lake region; and at San Diego, Cal., the minimum temperature, 32, was as low as ever reported in December.

During the 27th the cold wave reached the middle and south Atlantic coasts; in New England and the Saint Lawrence Valley the temperature continued above the normal; the line of freezing weather extended to Mobile, Ala.; and the lowest temperature of the month was noted at stations in the Lake region, the lower Mississippi valley, and on the west Gulf coast. During the 28th the cold wave disappeared off the Atlantic coast. On this date the temperature fell below zero in the Red River of the North Valley, and the line of freezing weather extended over the plateau region and the eastern slope of the Rocky Mountains to Mexico. By the 29th this cold wave had extended over the Lake region, with zero temperature in the north Lake Superior region, and freezing weather to the central east Gulf states; by the 31st it passed off the Atlantic coast, with temperature below zero in the Saint Lawrence Valley, and freezing weather to Georgia.

FROST.

The first heavy frost of the season was reported as follows: 3d, New River, Ariz.; Fresno, Cal. 5th, Eureka and Red Bluff, Cal. 6th, Sacramento, Cal.; Tatoosh Island, Wash. 12th, Yuma, Ariz. 17th, Austin, Tex. 18th, Rio Grande City, Tex. 19th, Dudleyville, Ariz.

On the 5th light frost injured tender vegetation near Los Angeles, Cal. The first light frost of the season occurred at San Diego, Cal., on the 6th, causing some injury to vegetation in the mountain valleys. The cold of the 6th killed the tender growth of orange and fig trees at Peoria, Ariz. The first heavy frost of the season occurred generally in the region about Los Angeles, Cal., on the 25th. Vegetables and berries in the bottom lands were generally killed, a small percentage of the orange crop was frosted, and considerable damage was caused to young trees and nursery stock. The first heavy frost of the season occurred generally about San Diego, Cal., on the 26th. Considerable damage was caused to the orange crop, and vegetation of all kinds was badly injured. Ice one-half inch in thickness formed on shallow pools, and in Mission Valley ice formed one inch in thickness and oranges were frozen. On this date young orange trees were badly damaged by cold at Peoria, Ariz. The first light frost of the season was reported at Tampa and Tarpon Springs, Fla., on the 28th.

PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for December, 1891, as determined from the reports of about 2,000 stations, is exhibited on Chart III. In the table of miscellaneous meteorological data the total precipitation and the departure from the normal are given for regular stations of the Weather Bureau. The figures opposite the names of the geographical districts in the columns for precipitation and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal and subtracting when above.

In December the monthly precipitation is usually greatest on the north Pacific coast, where it exceeds 10.00; the normal amount exceeds 8.00 along the Pacific coast north of the 38th parallel, in parts of northeastern California, and in a small area in northeastern Louisiana; and it exceeds 4.00 from the middle and east Gulf coasts to the middle Ohio valley, along the immediate Atlantic coast from North Carolina to southern New England, and over Nova Scotia and southeastern Maine. Except in parts of the northern plateau region the monthly precipitation is less than 1.00 over the greater part of the

Rocky Mountain and plateau regions and thence over Kansas, Nebraska, the Dakotas, and Minnesota.

In December, 1891, the monthly precipitation was greatest on the extreme north Pacific coast, where it exceeded 20.00 at Neah Bay and Tatoosh Island, Wash.; it exceeded 10.00 along the Pacific coast north of the 40th parallel; and more than 8.00 fell along the line of the Central Pacific Railroad crossing the summit of the Sierra Nevada Mountains in California, and in an area extending over east-central Texas. Over the western part of the southern plateau region, and in parts of the upper Missouri, Saskatchewan, and middle Rio Grande valleys, the monthly precipitation was less than 0.25, and it was less than 1.00 generally on the eastern slopes of the Rocky Mountains north of the 40th parallel, over the Dakotas and Montana, in southern Texas, and over the southwest part of the Florida Peninsula.

DEPARTURES FROM NORMAL PRECIPITATION.

The areas of excess and deficiency of monthly precipitation were irregularly distributed. The precipitation was in excess of the December average on the north Pacific coast and thence southeastward to the west Gulf states, from the southeast